Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Good

Emuckfaw Creek in Tallapoosa County Near Zana (33.27708/-85.69938)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Emuckfaw Creek watershed for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring and to estimate overall water quality within the ACT basin group.

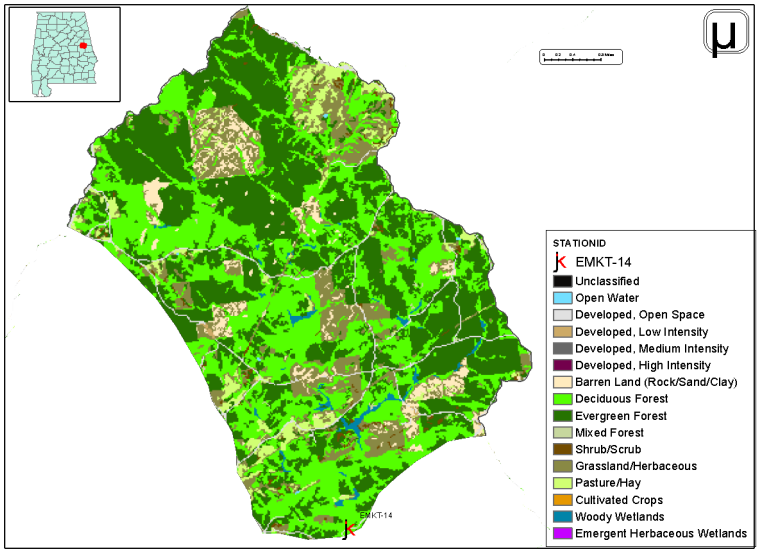

Figure 1. Sampling location and landuse within the Emuckfaw Creek watershed at EMKT-14.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Emuckfaw Creek is a *Fish & Wildlife (F&W)* stream located near the city of Zana in the Tallapoosa River basin. Landuse within the watershed is primarily forest (74%), with grassland/herbaceous areas (Fig. 1), which are typical of watersheds in the Southern Inner Piedmont (Table 1). As of June 9, 2008, ADEM's NPDES Management System database did not show any permitted discharges located within the watershed.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		28
Ecoregion[a]		45a
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	35
	Evergreen	39
	Mixed	<1
Shrub/scrub		1
Grassland/herbaceous		13
Pasture/hay		4
Development	Open space	3
	Low intensity	<1
Barren		4
Population/km^2 [b]		8

a.Southern Inner Piedmont
b.2000 U.S.Census Data

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Emuckfaw Creek at EMKT-14 is a medium-gradient, riffle run stream characterized by sand and gravel substrates. Overall habitat quality was categorized as *sub-optimal* due to sedimentation and a lack of bank and vegetative stability.

Table 2. Physical characteristics at EMKT-14, May 9, 2005.

Physical Characteristics		
Width (ft)		30
Canopy cover		Mostly Open
Depth (ft)		
	Riffle	0.8
	Run	1.5
	Pool	2.5
% of Reach		
	Riffle	35
	Run	35
	Pool	30
% Substrate		
	Bedrock	1
	Cobble	13
	Gravel	30
	Sand	43
	Silt	3
	Organic Matter	10

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is an average of the score for each metric. Metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 3. Results of the habitat assessment conducted May 9, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	78	Optimal (> 70)
Sediment deposition	43	Marginal (41-58)
Sinuosity	83	Sub-optimal (65-84)
Bank and vegetative stability	46	Marginal (35-59)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	167	
% Maximum score	**69**	**Sub-optimal (59-70)**

Table 4. Results of the macroinvertebrate bioassessment conducted May 9, 2005.

Macroinvertebrate Assessment Results			
	Results	**Scores**	**Rating**
Taxa richness measures		**(0-100)**	
# Ephemeroptera (mayfly) genera	20	100	Excellent (>85)
# Plecoptera (stonefly) genera	6	100	Excellent (>75)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
Taxonomic composition measures			
% Non-insect taxa	1	95	Excellent (>87.1)
% Non-insect organisms	1	98	Excellent (>97)
% Plecoptera	7	36	Good (19.7-59.8)
Tolerance measures			
Beck's community tolerance index	29	100	Excellent (>80.4)
WMB-I Assessment Score	**---**	**84**	**Good (72-86)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. The site did not exceed numeric criteria for metals. However, median concentrations of total iron were above values expected in this ecoregion.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. However, overall habitat quality was categorized as *sub-optimal* due to sedimentation and a lack of bank and vegetative stability. Median total iron concentrations were above values expected in the Southern Inner Piedmont ecoregion.

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Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	9	13.0	28.0	21.0	20.0	4.4
Turbidity (NTU)	9	3.1	18.0	5.6	7.5	5.1
Total dissolved solids (mg/L)	7	14.0	47.0	38.0	33.3	12.8
Total suspended solids (mg/L)	7	5.0	20.0	7.0	9.1	5.3
Specific conductance (µmhos)	8	15.2	34	27.7	27.4	5.7
Hardness (mg/L)	4	6.7	8.8	6.9	7.3	1.0
Alkalinity (mg/L)	7	6.9	25.5	8.7	10.9	6.6
Stream Flow (cfs)	8	17.0	78.6	38.9	39.8	---
Chemical						
Dissolved oxygen (mg/L)	9	7.7	11.08	9.3	9.2	1.0
pH (su)	9	6.8	7.77	7.0	7.0	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.037	0.008	0.013	0.011
Nitrate+Nitrite Nitrogen (mg/L)	7	0.040	0.096	0.065	0.068	0.020
Total Kjeldahl Nitrogen (mg/L)	7	0.025	0.481	0.075	0.155	0.155
Total nitrogen (mg/L)	7	0.054	0.524	0.142	0.199	0.173
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.007	0.002	< 0.004	0.002
Total phosphorus (mg/L)	7	0.011	0.056	0.039	0.038	0.014
CBOD-5 (mg/L)	7	< 1.0	4.2	1.3	1.7	1.3
COD (mg/L)	5	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	7	3.7	2.0	4.2	4.1	0.3
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	0.015	0.21	0.058	0.084	0.097
Iron (mg/L)	4	0.453	0.557	0.508[M]	0.506	0.050
Manganese (mg/L)	4	0.005	0.023	0.005	0.009	0.010
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.13	0.008	0.038	0.061
Antimony (µg/L)	4	< 2	< 2	1	1	0
Arsenic (µg/L)	4	< 10	< 10	5	5	0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000
Iron (mg/L)	4	< 0.005	0.143	0.102	0.088	0.061
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.02	0.002	0.007	0.009
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.00
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
[J] Chlorophyll a (mg/L)	7	0.53	21.36	2.14	4.81	7.44
[J] Fecal Coliform (col/100 mL)	7	17	330	56	94	108

E=estimate; N=# samples; M=value > 90th percentile of all data collected within eco-region 45a